

## CLAIMS.

1. A satellite communications system comprising a satellite, in orbit about the earth, a plurality of user terminals on the surface of the earth, and an earth station, operative to exchange signals with each of said plurality of user terminals via said satellite, said system being characterised by: each of said plurality of user terminals and said earth station being co-operative to measure the position of said each of said plurality of user terminals on the surface of the earth; by said earth station being operative to indicate to each of at least some of said plurality of user terminals in which one of a plurality of zones they respectively are located; by, said earth station being operative to detect a congestion condition and to detect from which zone or zones the congestion originates; said earth station being operative to indicate to said at least some of said plurality of user terminals the identity of that zone or those zones from which congestion originates; and by each of said at least some of said plurality of user terminals observing congestion control measures if said respective indicated zone of each of said at least some of said plurality of user terminals lies within a zone from which congestion originates.
2. A system, according to claim 1, wherein said congestion control measures include; said earth station

allocating and communicating a respective graded service level indicator to said each of at least some of said plurality of user terminals, said earth station allocating a minimum service level to allow access to  
5 said system when each of said at least some of said plurality user terminals is within said distance of said point, and each of said at least some of said plurality of user terminals attempting to access said system only if said respective allocated service level indicator  
10 exceeds said minimum service level.

3. A system, according to claim 1 or claim 2, wherein said earth station is operative to maintain a table of the position and time of each of said plurality of user terminals making a request for service, and is  
15 operative to detect a condition of radio congestion in a zone if more than a predetermined number of requests for service arise in a predetermined time within that zone.

4. A system, according to claims 1, 2 or 3, wherein said earth station is operative to detect a congestion  
20 condition if more than a predetermined proportion of requests for service from said plurality of user terminals are unreadable.

5. A system, according to claim 4 when dependent upon claim 2, wherein said earth station is operative,  
25 progressively, to adjust said minimum service level, to maintain said proportion of unreadable requests below

said predetermined proportion.

6. A system, according to any of the preceding claims, wherein said satellite is operative to provide a array comprising plurality of adjacent spot beams to give  
5 radio coverage to the surface of the earth, said earth station being operative independently to maintain said detection of said congestion condition and independently to provide said indication of said point and said distance for each of said plurality of spot beams.

10 7. A system, according to claim 6, wherein said array is in movement with respect to the surface of the earth, and wherein, as one spot beam replaces another spot beam to cover said area of congestion, said earth station is operative to transfer all data relating to  
15 congestion control in said one spot beam for use in operation of said another spot beam.

8. A method for use in a satellite communications system comprising a satellite, in orbit about the earth, a plurality of user terminals on the surface of the  
20 earth, and an earth station, operative to exchange signals with each of said plurality of user terminals via said satellite, said method being characterised by including the steps of: each of said plurality of user terminals and said earth station co-operating to measure  
25 the position of said each of said plurality of user terminals on the surface of the earth; said earth station

indicating to each of at least some of said plurality of user terminals in which one of a plurality of zones they respectively are located; said earth station detecting a congestion condition and detecting from which zone or  
5 zones the congestion originates; said earth station indicating to said at least some of said plurality of user terminals the identities of that zone or those zones from which congestion originates; and each of said at least some of said plurality of user terminals observing  
10 congestion control measures if said respective indicated zone of each of said at least some of said plurality of user terminals lies within a zone from which congestion originates.

9. A method, according to claim 8, wherein said  
15 congestion control measures include the steps of; said earth station allocating and communicating a respective graded service level indicator to said each of at least some of said plurality of user terminals, said earth station allocating a minimum service level to allow  
20 access to said system when each of said at least some of said plurality user terminals is within said distance of said point, and each of said at least some of said plurality of user terminals attempting to access said system only if said respective allocated service level  
25 indicator exceeds said minimum service level.

10. A method, according to claim 8 or claim 9,

including the steps of said earth station is maintaining a table of the position and time of each of said plurality of user terminals making a request for service, and detecting a condition of radio congestion if more  
5 than a predetermined number of requests for service arise in a predetermined time within a predetermined area.

11. A method, according to claims 8, 9 or 10, including the step of said earth station detecting a congestion condition if more than a predetermined  
10 proportion of requests for service from said plurality of user terminals are unreadable.

12. A method, according to claim 11 when dependent upon claim 9, including the step of said earth station progressively, to adjusting said minimum service level to  
15 maintain said proportion of unreadable requests below said predetermined proportion.

13. A method, according to any of claims 8 to 12, wherein said satellite is operative to provide a array comprising plurality of adjacent spot beams to give radio  
20 coverage to the surface of the earth, said method including the step of said earth station be independently maintaining said detection of said congestion condition and independently providing said indication of said point and said distance for each of said plurality of spot  
25 beams.

14. A method, according to claim 13, wherein said

array is in movement with respect to the surface of the earth, said method including the step of , as one spot beam replaces another spot beam to cover said area of congestion, said earth station transferring all data  
5 relating to congestion control in said one spot beam for use in operation of said another spot beam.

15. A user terminal, being one of a plurality of user terminals, for user in satellite communications system comprising a satellite, in orbit about the earth,  
10 said plurality of user terminals on the surface of the earth, and an earth station, operative to exchange signals with each of said plurality of user terminals via said satellite, said user terminal being characterised by: each of said plurality of user terminals and said  
15 earth station being co-operative to measure the position of said each of said plurality of user terminals on the surface of the earth; by each of at least some of said plurality of user terminals being operative to receive, from said earth station, indication of in which one of a  
20 plurality of zones they respectively are located; by, when said earth station detects a congestion condition and detects from which zone or zones the congestion originates, each of said at least some of said plurality of user terminals being operative to receive, from said  
25 earth station, indication of the identity of that zone or those zones from which congestion originates; and by each

of said at least some of said plurality of user terminals observing congestion control measures if said respective indicated zone of each of said at least some of said plurality of user terminals lies within a zone from which  
5 congestion originates.

16. A user terminal, according to claim 15, wherein said congestion control measures include; said earth station allocating and communicating a respective graded service level indicator to said each of at least some of  
10 said plurality of user terminals, said earth station allocating a minimum service level to allow access to said system when each of said at least some of said plurality user terminals is within said distance of said point, and each of said at least some of said plurality  
15 of user terminals attempting to access said system only if said respective allocated service level indicator exceeds said minimum service level.

17. A user terminal, according to claim 15 or claim 16, for user in a system wherein said earth station is  
20 operative to maintain a table of the position and time of each of said plurality of user terminals making a request for service, and is operative detect a condition of radio congestion if more than a predetermined number of requests for service arise in a predetermined time within  
25 a predetermined area.

18. A user terminal, according to claims 15, 16 or

17, for use in a system wherein said earth station is operative to detect a congestion condition if more than a predetermined proportion of requests for service from said plurality of user terminals are unreadable.

5 19. A user terminal, according to claim 18 when dependent upon claim 16, for use in a system wherein said earth station is operative, progressively, to adjust said minimum service level, to maintain said proportion of unreadable requests below said predetermined proportion.

10 20. A user terminal, according to any of claims 15 to 19, for use in a system wherein said satellite is operative to provide a array comprising plurality of adjacent spot beams to give radio coverage to the surface of the earth, said earth station being operative  
15 independently to maintain said detection of said congestion condition and independently to provide said indication of said point and said distance for each of said plurality of spot beams.

20 21. A user terminal, according to claim 20, for use in a system wherein said array is in movement with respect to the surface of the earth, and wherein, as one spot beam replaces another spot beam to cover said area of congestion, said earth station is operative to transfer all data relating to congestion control in said  
25 one spot beam for use in operation of said another spot beam.



22. An earth station, for use in a satellite communications system comprising a satellite, in orbit about the earth, a plurality of user terminals on the surface of the earth, and said earth station, operative to exchange signals with each of said plurality of user terminals via said satellite, said earth station being characterised by: each of said plurality of user terminals and said earth station being co-operative to measure the position of said each of said plurality of user terminals on the surface of the earth; by said earth station being operative to indicate to each of at least some of said plurality of user terminals in which one of a plurality of zones they respectively are located; by, said earth station being operative to detect a congestion condition and to detect from which zone or zones the congestion originates; and by said earth station being operative to indicate to said at least some of said plurality of user terminals the identity of that zone or those zones from which congestion originates for each of said at least some of said plurality of user terminals observing congestion control measures if said respective indicated zone of each of said at least some of said plurality of user terminals lies within a zone from which congestion originates.

23. An earth station, according to claim 22, wherein said congestion control measures include; said

earth station allocating and communicating a respective graded service level indicator to said each of at least some of said plurality of user terminals, said earth station allocating a minimum service level to allow  
5 access to said system when each of said at least some of said plurality user terminals is within said distance of said point, and each of said at least some of said plurality of user terminals attempting to access said system only if said respective allocated service level  
10 indicator exceeds said minimum service level.

24. An earth station, according to claim 22 or claim 23, operative to maintain a table of the position and time of each of said plurality of user terminals making a request for service, and to detect a condition  
15 of radio congestion if more than a predetermined number of requests for service arise in a predetermined time within a predetermined area.

25. An earth station, according to claims 22, 23 or 24, operative to detect a congestion condition if more  
20 than a predetermined proportion of requests for service from said plurality of user terminals are unreadable.

26. An earth station, according to claim 25 when dependent upon claim 23, operative, progressively, to adjust said minimum service level, to maintain said  
25 proportion of unreadable requests below said predetermined proportion.

27. An earth station, according to any of claims 22 to 26, for use where said satellite is operative to provide a array comprising plurality of adjacent spot beams to give radio coverage to the surface of the earth, said earth station being operative independently to maintain said detection of said congestion condition and independently to provide said indication of said point and said distance for each of said plurality of spot beams.
- 10 28. An earth station, according to claim 27, for use where said array is in movement with respect to the surface of the earth, said earth station, as one spot beam replaces another spot beam to cover said area of congestion, being operative to transfer all data relating to congestion control in said one spot beam for use in operation of said another spot beam.
29. A system, substantially as described with reference to the appended drawings.
30. A method, substantially as described, with reference to the appended drawings.
- 20 31. A user terminal, substantially as described, with reference to the appended drawings.
32. An earth station, substantially as described, with reference to the appended drawings.